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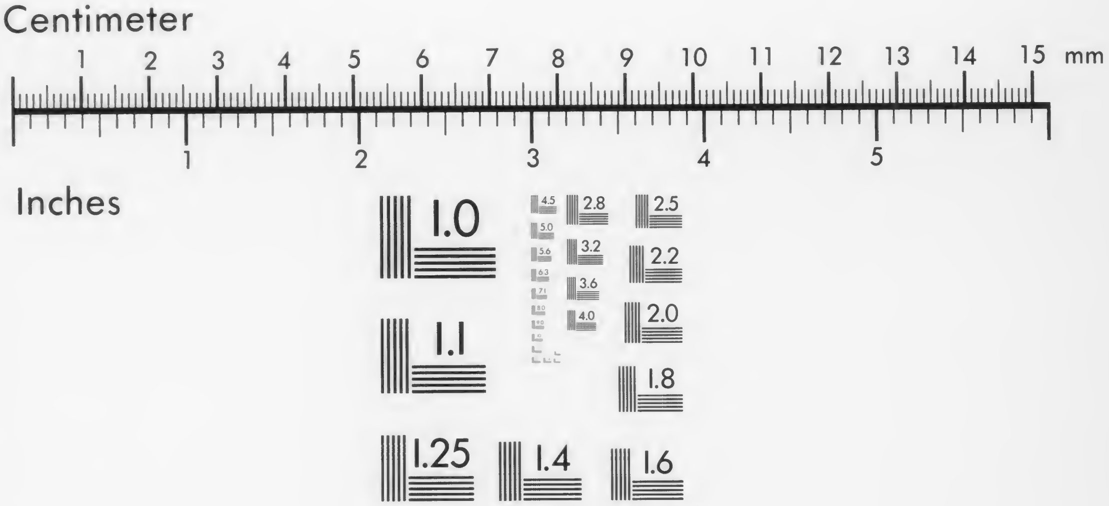

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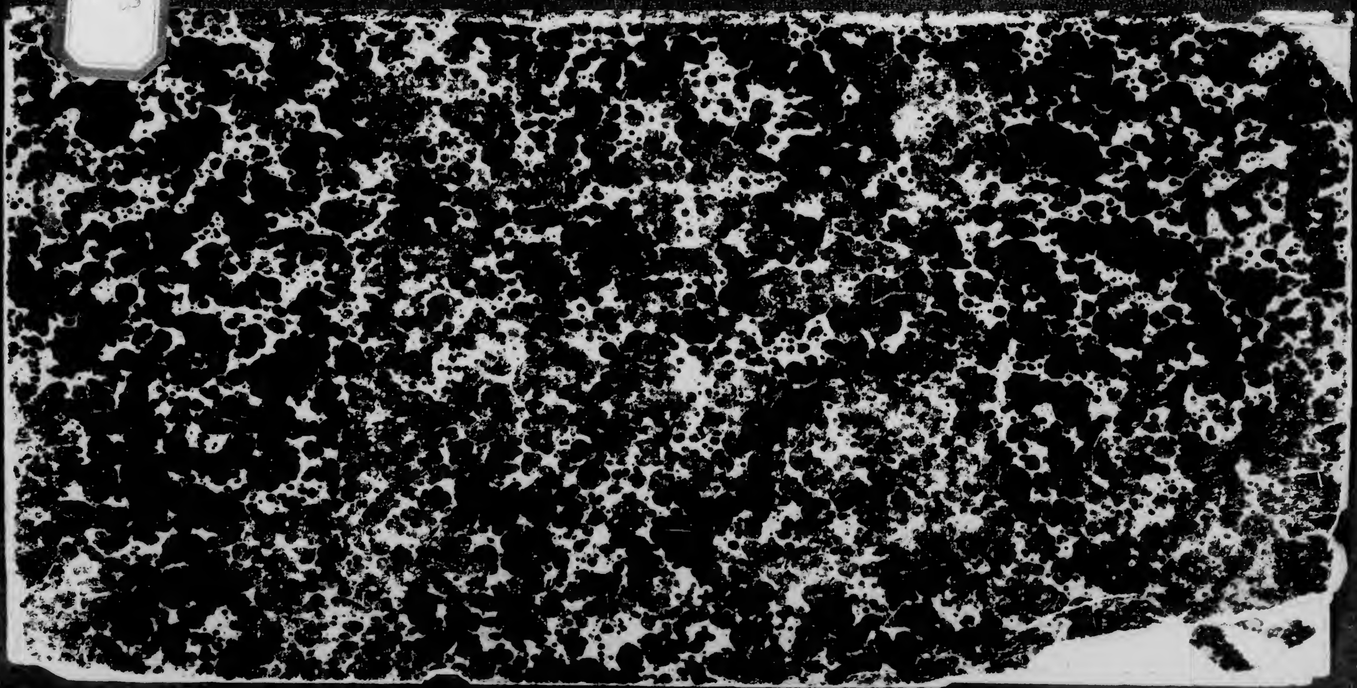

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Prof. J. McK. Cattell

A NEW STUDY OF NATURE

BY

GEORGE W. EDGETT, B.L.

Yours truly,
George W. Edgell.

23 Nov 07 MAE

A NEW STUDY OF NATURE.

If the works of creation, so finely portrayed by "Paley's Natural Theology," should be accounted for by natural evolution, many people are afraid that it would disprove the necessary existence of a Supreme Being.

In order to remove all fear of this possibility, let us try the primary elements for proof of a necessary intelligence in the spirit of their laws.

It is usual to suppose that the primary elements, or elemental substances of nature, are always the same, and not changeable, alterable, or transmutable, by any applied power of evolutionary volition in the universe.

Going a step further, it is also claimed that various effects and different things are not producible in and of the same various elements when united in the same proportions.

Per contra, however, it appears that various spices, and the oils of some different fruits and flowers, are so produced.

The properties of coal gas and the oil of roses are elaborated in equal quantities of the same elements,

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— four atoms of hydrogen and four of carbon making a compound atom of both.

Science undertakes to explain such phenomena of diverse effects, changes and varieties, by assuming their cause to be different arrangements of constituent atoms.

Now if this theory is, indeed, the true one, it not only fails to explain away the necessity of a creative will-power in nature, but it is forced to assert the necessary existence of such power, in some ways analogous to the power of will in man, in order to account for those diversities of atomic and molecular arrangement, which are said to be the direct cause of such heterogenesis.

Two different animals from life-cells of the same material, fed by the same material; diversity of flowers nourished by the same elements; variety of men, — black, white, and otherwise different; the calfskin on your feet, and the wool of your garments, — so widely different, but both made of water, grass, and air; graphite, black charcoal, and the brilliant diamond, — each one pure carbon; none of these, nor any of the multiform differences in the world, are to be explained by simple elements as known to science, without assuming the existence of a natural, evolutionary volition in the elemental combinations that made them.

And just here we see what seems to be a fallacy in the philosophy of Lord Bacon, which was one of the primary lessons in evolution, of scientists like

Darwin, Huxley, and Haeckel. As a vast number of words are formed by combinations of the simple alphabet, so he sought the antecedent causes of all natural phenomena, in an alphabet of nature, as it were, or in a limited number of simple elemental natures, from which all varieties were deemed derivable, and thus to be accounted for. This theory was the grand center of his system; so he gave us a list of simple natures, as the grand axis of all research, asserting that the end of all human knowledge in natural science might be arrived at, by a few known causes, or by his elementary alphabet and order of induction.

But the fact of different ideas, or things expressed or produced, in one simple element, or in the same quantities of two or more elements, proves a reverse order of creative causation. It proves that the works of nature, its laws and simple elements, are to be studied and known, not only by means of the elements themselves, but by the properties, forms, and forces in which they are. For example: the character of carbon, as being charcoal, graphite, and diamond, could not be known without first having these things, whether we knew of it in many other forms and uses or not. And so of the other simple elements already known — seventy-five or more in number — as to any form of each; for it is found of nearly all, that each one is allotropic, or in different forms, qualities, and conditions like carbon.

And if this order of discovery by diverse things, as to their sole constituent, or as to the nature of any one element. is necessary, it must follow with still greater force, that it is likewise necessary as to the like and unlike combinations of different elements, in all the more complex varieties of nature. And so we come to the fact that universal phenomena, or ideas expressed in nature, are themselves the chief means of our knowledge, instead of their simple elements, as taught by Bacon. If the course of revelation in nature so pursued, corresponds with the order of creative causation from etherial states of matter, it thus appears that the cause of diverse properties, functions and forms of nature. is not in their simple elements, or combinations of them, but in the action of a superior power that differentiates. moves, co-ordinates and involves the elements.

To state the case another way — if equalities of like elements, singly, or in chemical unities, are not necessarily equal things, or the same things, whether inorganic, or characterized by the evolutions of life, it can only be accounted for by possible changes of mind-like energies in matter.

And so, to whatever extent things may be traced in materiality for causes, whether by natural selection (which proves a selecting intelligence), by chemical action, force, heat, motion, or otherwise, the same necessity will forever appear as to each and all for the existence of a supreme *vis viva* whose action is the same as that of thinking.

Amid all the generic diversities of organic life in

the same elements — which no exact science, no chemistry can explain — what makes the science of chemistry in any way possible, by fixing the exact proportion of combining constituents in any certain chemical compound ? Or, to amplify our inquiry, while different things of life are evolved in the same proportions of the same elements, why is each of those things (apparently made by a total change of elements) never resolvable by chemical analysis, into anything but those identical elements ? Plainly, the elements involved in the law are not makers of any law of evolution, or composition, by which they are used in the same proportion for different creations — except so far as they participate in, or assist the action of universal principles that control them.

The common theory of different grouping of the same unchangeable atoms of matter must fail to answer these inquiries unless it asserts, in addition, — the necessary existence of a diversifying intelligence of force in matter, or the control of universal mind, in order to explain both sides of the question — both the reliable stability of certain laws, and the changes made by evolution without violation of those laws.

And now suppose we assume it is true that diverse collocation of atoms, various derivation of elements, changes infinitely varied, and other such factors of causation, are sufficient to account for the varieties in nature; it still remains no less evident that there must have been a formative condition of substance possessed of powers like ideas, as a cause of individuating action, anterior to all such proximate causes of distinct individuation.

Sunbeams convey intelligence from the sun and by means of the spectroscope and spectrum, inform us of the elements they came from. By use of elemental means, those intelligible, or we may say, intelligent sunbeams, differentiate the unity of their attributes, or thoughts, thus producing chemical force, colors, light, heat, and conditions that are necessary for the beginning and evolution of physical life.

Tracing such super-physical phenomena through mutual action and transmutation of atoms to their solar motive power, it is found, as it is of different things traceable to one or more of the elements, or as it is of ideas from one brain, that manifold diversities are made by the same power in the same material means. And the fact that various forces are convertible into each other, as magnetism, electricity, heat, and chemical action are, or as liquids and solids are in all animal bodies, indicates a primary elemental oneness of universal substance, differentiated by the *vis viva* of infinite ideas — by the action of material energies which are properly called *thinking substance*, even though unconscious of being, except as they become conscious in the sensoriums of animal life, where they carry on the functions of heart, lung, liver, kidney, tissue, stomach, and nerve, without direction or volition of the animal.

As a corollary manifest from these deductions, we may observe that the utter destruction of physical bodies is not presumably their extinction as correlated energies and ideates of absolute existence, although unified with that inscrutable substance whereof they were, just the same as prismatic colors are unified in the rays of pure sunlight.

By this course of study, pursued in every direction, far and near, in or beyond the known and the yet unknown of nature, we are led to realize the necessary power of Deity, which is asserted to be less and less like an apparent necessity, as we come to know more of nature and the history of evolution. If any one will take the trouble to search very deeply into this problem, he will find that Power appearing greater and greater, just in proportion as nature becomes more wonderful to him by the more he knows.

Why it is very easy for people to fall — practically, if not positively — into atheism, is because common, or familiar things come to be unthought of as evidence of Supreme Being. "In Him we live, and move, and have our being," has come to mean no more than this: we live by air, water, and food; whereas, every atom and invisible interstice between atoms, in the process of transmutation into flesh, bone, nerve, and tissue, are necessarily possessed and filled by the inexplicable spirit of life — which can only be known as action, motion, change, without which there can be no life.

Just at this point, however, there seems to be an absurdity in first assuming that life is an entity, an actual something of energy, or substance, and then saying what implies that life is to be known as nothing more than a non-entitative condition of functional action without which it can neither begin to be, nor continue to exist. By this last assumption it appears that life, like motion made by various forces, is only a condition, a state of action, a non-entity that results from the correlations and combinations of moving, changing elements in organized bodies, which ceases to be even such non-entity when this condition of action is gone, or when the bodies of it are dead.

But nevertheless, whether the spirit of life is an entity, or a transitory, immaterial condition of things in motion, like a voice that sings from a phonograph; whether all the individualities of life, which differ as different sounds from the same phonograph at the same time, are the transient, evolutionary result of chances and changes in matter, or not; the perpetual stress of ubiquitous energy in action, a rational Cosmos, the actual being of substance, visible and invisible, acting on a universal scale, as our thoughts act in a finite way, is declared by a blade of grass, a rain drop, a breath of air, and the gases that compose them; is declared by its expression as insect, animal or man, by the self-cognition of such expression, and by all the sequences of diversified intelligence in living forms. While it continues, any and

all individual life that we know of, is certainly in, of, or by means of material things; but when matter ceases to exhibit, or to be characterized by the phenomena of such life, or action, we say the life is lost, although matter itself is indestructible.

One little flower, one little song bird, as well as the great variety of them, made by the resolution of cryptic forces, is a mystery of formative power, just as inscrutable as that of human thought, formed by means of the decomposition of tissues of animated brain cells. From senseless, dead materials combined in action, arose the organic power of smell, taste, feeling, hearing, and seeing, which are thought to be fully understood when we learn about the means engaged. The machinery, and not the power of causation involved in their combination, or connected with them, is all that we know of the senses, excepting sensation or effect.

In this, as in all other fields of nature, — beyond what is apparent, or determinable, as to forms, properties, conditions, effects, relations, and changes, — we may truly say, with the sage of Athens, in respect to positive sense-knowledge of matter *in esse*, or of substance itself:

> "All that we know is, nothing can be known."

But the necessary existence of a primordial substance unknown, adequate to enable the beginning and evolution of what appears in elemental and living forms, is just as positively certain as it is that an infant must now be the product of mother and father, although no one in the whole world knows who they are, or ever had any positive knowledge of them, except themselves.

This truth is equally evident from all we know of nature, whether we assume to be true, the old theory of an anthropomorphic Deity, or that of a Supreme Unity, whose laws and thoughts are the forces and attributes of matter; whether we suppose that forms of matter are phenomena of mind, or thoughts made visible, as taught by monism, or, what is far less credible, that the inherent forces of the elements, *independent* of anything like mind, or mental action, either intrinsic, or extrinsic, are the actual, eternal cause of universal creation.

It is argued in favor of this last theory, that the forces of nature are not possessed of anything like mind, or thought, because there appears to be no directive will, pity, or power to avert destruction by disease, lightning, cyclone, volcano or flood: but look you into the spirit of undeniable intelligence in mankind itself for the same condition of affairs within its own realm of power. Review the deadly passions there, — flood, tempest, the fever of war, ambition, plunder, empire, murder, destruction, — in action like a Mt. Pelee or old Vesuvius, in spite of any thought or will to the contrary. As in the man, so in the body of all nature, the fact of having what we call a mind is not disproved by suicide, by the deadly gases of Mt. Pelee, or the physical miseries of the human race. A human being, moved by thinking power, can slay innocent creatures of nature without pity or remorse; and the universal spirit of matter, having that same power, may be indifferent as to life, pain, death — except in the feeling of whatever it is that suffers.

The inevitable of rational law in the impersonal of nature, is far more kind to man than man is to himself. Only a million people destroyed by earthquakes and volcanoes during the same time in which many millions have been slaughtered by men engaged in war, is proof enough to confirm that fact, without reference to the superior wisdom of bountiful provisions in nature for the happiness of man, as compared with the wisdom that we exercise in the use of them.

Volitions in action everywhere in nature, within the rule of laws that limit possibilities, are just as manifest in the course of impersonal forces as they are in the personal attributes of mankind, where they are likewise limited in power by the necessary control of law. Call it what you like — the action of blind force, or the act of an all-wise will — when the invisible spirit of oxygen made chemical union with hydrogen, and so enabled organic life on earth by means of water, there was a productive agency created that makes the productive work of man seem very small indeed. And so of carbon, another essential without which all organic life as now constituted, were impossible. When solid carbon is converted into gas by burning in the air, it unites with oxygen to make carbon dioxide (carbonic acid gas) which is decomposed so the carbon alone can be appropriated by all plants, or forms of vegetation; and these are a prior necessity, a *sine qua non* of all animal life on earth. In this way came carbon to be the great central factor of all nature's organic framework in plants and animals.

Besides carbon, oxygen, nitrogen, and hydrogen, whether any one of other elements which also enter into the composition of living forms, was once, or is now an indispensable factor for their evolution and support, is a double question, the last part of which might be answered by withholding one at a time, or all of them, from the food given to an animal or plant, during sufficient time to determine the truth. Calcium, in its only oxide form is lime, which combined with phosphoric acid, composes the mineral portion of animal skeletons, and is a large ingredient of plants. In the absence of calcium, would something else have taken its place? Potassium, sodium, chlorine, magnesium, phosphorus, sulphur, iron, and lithium are also found in the composition of human forms. So it appears that about a dozen of the elementary substances, out of seventy-five now known, are engaged in making the innumerable varieties of combinations in the organized forms of life.

Out of chaos how did this arrangement come about? During untold ages of terrible experience in perpetual revolution, confusion, and fiery conflict, as attested by scars of war on the body of Earth, the

elements worked out and entered into a wonderful agreement, which we will illustrate by the example of only a single element or two. It was finally arranged among those warring powers, by the master spirit of elective and chemical affinity, to make a living constitution by which the great body of oxygen should settle into solid forms and compose nearly half the globe, while pure air should be composed of four-fifths nitrogen and only one-fifth oxygen in order to avoid the occurrence of another conflagration that might destroy the world, in case the inflammable spirit of oxygen were given the ascendency by volume or weight over its restraining associate in the atmospheric mixture. To compensate for this small portion of it engaged in the enjoyment of breathing life, the elemental lawmakers gave to oxygen the glory of being 8/9, or 8 pounds to 1 of hydrogen, in pure water.

To recount the chief points of correlation, and the chemical details of rational action among the elements, would require a very large book. It would far exceed the intended limit of this essay to include a study of water alone; so we only say: it is the king of solvents, savior of the world's life, maker of the world's beauty, a grand divinity that purifies the body of it all. It is to all vegetation what blood is to animals, exists in our bodies, three-fourths of all we are by weight, climbs the highest tree to meet the sunlight on the leaves, helps them to remove oxygen from carbonic acid, to inhale the carbon, and convert it into wood.

The sun could paint no color on leaf, flower, fruit, without water to mix and make the substance for his brush to work upon. The floral kingdom of a million tints, the gorgeous sunset, the blue color of heaven's vault, would not appear, and light would cease to be diffused beyond the actual presence of sunbeams; were it not for water, for the aqueous vapor in the sunset clouds, and the perpetual vapor of a cloudless atmosphere, that makes, together with etherial dust, an aerial ocean of reflective atoms.

No wonder the ancients had their water gods. Of boundless scope in the direction of utilities, from boiling food to floating ships, from warming houses to working engines, from the support of all aquatic life to the provision of gulf-streams, warm rivers, currents in every sea, to carry and distribute heat around the globe, — that liquid spirit condensed from the invisible, most certainly doth signify the inherence of a deity. It enters into caves and rocks to make gems and crystals, or deposit useful ores. It disintegrates the very rocks it made ages before to work out soil in which to grow its roots and herbs, or raise its plants and vegetables.

How wise it seems to be! How soothing, soft, and gentle is the touch of that great hydropathic doctor, whose body is sacrificed to heal the sick, to furnish tonic from a thousand sources in the earth, to satisfy the fevered thirst, to wash away the refuse of disease! Mindless matter! Nay, my good sir, look again. It stores up ten times more heat than iron, while both are being heated to the same degree, and to avoid its loss, or to protect the inhabitants of its bosom from extremes of cold, it covers over with a coat of ice; and apparently for a similar reason, it provides a crystal fleece of snow to protect cold regions from deep freezing, in order to enable a necessary growth of food. Is this mere chance, or a happen-so of thoughtless, dead, brute matter?

Look you further: To guard the water supply made by running streams, and the aquatic life it cherishes in rivers, lakes, and ponds — *unlike other bodies*, it *expands* from 40 degrees above zero downward, and thus prevents the colder part from sinking and freezing solid from the bottom upward, which would destroy its utility of motion and the multitude of fish that live within it in frigid localities.

It is not only the compositor, but an essential part of what the ordinary observer would say has nothing at all to do with water. For example: the analysis of soapstone, gypsum, talcose and other rocks, proves that water is a necessary, intrinsic factor of them. In view of such facts it is not surprising that the ancient chemist thought water to be transmutable into solid forms of matter, and therefore supposed it possible to transmute baser metals into gold.

The earth's atmosphere — the air we breathe — composed of intermingled gases, of which two are the only constant or essential parts — permeated by the force of gravity that holds it down, pervaded by the tonic of electricity and magnetic power — air, the invisible wonder of our flying world, that blankets us from freezing under an outside cold of 300 degrees below zero, that changes water and the food it carries into crimson blood, that serves us fragrance, music, light, and heat — air, the immense, unseen tenuity of breath, adapted to countless diversities of life that are likewise adapted to its use in their evolution, — is a miracle of supreme genius that none can realize without a feeling of gratitude and love; but with all the glory of its wisdom in vitalizing stores for meadow, forest, field or flower — with all the freightage of its mighty spirit, that carries water from the lakes and seas to wash the continents, supply their streams and make their crops grow — yet does it seem less closely lovable, less bountiful of self in offices of friendship, love, beauty, and delight, than water is. But the adoration they inspire should be alike, for they are equally the living atoms of a supreme power.

If water is not an actual substance of thought, an intelligent energy of matter, then there is no such thing as matter of potential energy in the brain of man that can be called intelligent. A single raindrop, made by 1,800 times its bulk of gases, neither of which can be reduced to liquid (under any natural temperature) by twenty tons of artificial pressure to the square inch, is so made and held from being resolved back into its gases, by the immense power called chemical affinity, that it takes the electric force of a mighty thunderbolt, in that one drop of water, to overcome it. Is there no stress of energy in this condition that can be called a state of thinking? This is but a single instance of power involved, among thousands that appear in combinations and changes made by water, in the formation and dissolution of other compounds.

Let that stress of energy which constitutes the body of water be withdrawn, and what would happen? It would disappear from every place on earth, together with all organic life, no less certainly than rocks and mountains would crumble down without cohesive and chemical attraction — no less certainly than the great globe itself would disappear in dust or flame, if motion and the force of gravity were suspended for a single instant, which would stop our flight of nineteen miles a second, or eleven hundred and forty miles a minute, round the sun.

Stupendous perpetuity of might! Changeless amid incessant change, indestructible amid destruction! Boundless paradox of self-opposing energies in lines of infinite extension from an infinity of points, interlacing millions of solar systems together and apart! Such is the power of God, the soul of matter, the universal mind, in evolution, in the self-preservation of nature — inseparable from the stuff and properties of matter as conceived of by the light of reason.

In respect to the further rationale of this conclusion, — although intention, purpose, forethought, invention, design, is not a necessary condition of mental being, or not a necessity of thinking, either in a human, or an evolutionary way; nevertheless, if organic evolution is indeed the result of definitive intention or design before the world was, it is still no less evident that the elements and properties of universal matter, which made evolution possible, were necessarily the very thoughts of that intention; so being themselves the artificers, laborers, and materials all in one, that have produced, or have become, primarily the world itself, and then the living structures of it.

It is far more conceivable that a supreme projector of this whole creative scheme is involved in it than it is that an infinite personality, independent of nature, has made it all without hands, by the effluence of a personal mind devoid of both visible and invisible materiality. By invisible materiality we mean things of actual substance, like the odor of a rose, corpuscular sound carried over a telephone wire, all the varieties of gas, the force of gravity, electricity, light, heat, magnetism, the powers in chemical attraction, repulsion, catalysis, — each one of which is no less material than a granite rock is; for even though they are nothing but different conditions of the same substance with different names, they are no less material than if they were different substances. This truth is self-evident, apart from any question as to the nature, cause, or constitution of such phenomena.

If it be that such phenomenal substance in every diversity of action — in light, heat, magnetism, odors, gases, etc. — is the actual existence of God's thought in everything, — then, to realize how completely thoughts of God must differ from man's thoughts (being the actual substance of things, which human thoughts are not), consider the non-entitative forms, conditions, qualities, and relation of things as they appear in the qualitative faculty of man, compared with the absolute reality of things themselves. In respect to forms, conditions, and qualities which are not things, take this example: One person says a thing is white, warm, triangular, luminous, soft, porous, and brittle, while at the same time another thinks it is not so; because he views it from a different standpoint, or by different criterions. No two persons may be able to judge it the same, for no two are exactly alike; but amid the conflict of opinion about such non-entities, there is no doubt whatever that the thing itself is a real, positive material existence.

And so it is in relation to universal power — a Supreme Being; — every conception of his nature, deism, pantheism, materialism, every view of his character, qualities, or attributes, every belief or disbelief as to orthodox views of his government, is merely an immaterial opinion that bears no closer relation to the actual substance of a supreme entity than a human thought does to the solid earth. We are taught by this how utterly absurd have been the horrors of warfare, the monstrous tyrannies of religious power, the terrible nightmares of perpetual conflict, about different ideas of a Creator. The proper use of these ideas is to inspire a self-satisfying personal reliance upon some rational system of doctrine that civilizes and enlightens, that makes men better, wiser, more just, more loving, more in harmony with the true, the beautiful, and the good.

After proof at the outset of this argument that the elements are not the makers of evolution, inasmuch as the same elements are used in the same proportions for some different creations, — it may appear inconsistent, or contradictory, to claim afterward that the elements and their attributes are the very things, thoughts, principles, and energies that constitute the body of nature, and enable the action of its laws. This paradox of deductions, however, arises from the necessary distinction made between the limited, definite, physical expressions of universal energies, and the limitless extension of these energies, whose union it is, in the nature of a supreme mentality, that organizes and controls the universe.

Considered in their finite, distinct, or definable character, as they appear to us by our senses, either in form, property, chemical action, or otherwise, apart from the universal unity of principles that possess and are possessed by them, the elemental varieties of nature afford no solution of the evolutionary miracle. So far, and to such extent, then, the first part of our paradox is true.

And now, to explain the second part of it, let us examine how different things contribute to their own evolutionary changes, and to their own government, in an elemental democracy of cosmic union. Look at the suggestive fact that a material invisible, a couple of gases, a volume of vapor, a frozen rain-drop, a flake of snow, a drop of water in the ocean (all the same substance), is each and all related to the whole body of water on earth, and to the immense effect of it in nature, as each atom of every element, every material body and the whole globe, are related to a supreme consummation of power, in which they are obedient subjects and partial factors. The elements so engaged certainly lose their individual character (perceptibly or imperceptibly) in respect to what they give to make such power, or in so far as they become and supply the effluence of united principles that constitute that power. In a manner analogous to this, the elements lose their elemental character in what they furnish, by means of organic chemistry, to make a human mind, which controls the physical combination that made it.

Here we have an effect of organic unity in man that is typical of the necessary effect of universal unity, which has a similar control, by virtue of which came the evolutions of organic life. Whether we say that the inception of such life, or the first forms of it, resulted from the various appetencies of correlated elements and energies in mutual action, or from the ideas of Deity as they exist in matter, we say exactly the same thing in each statement; provided we mean anything rational or definable by those words — the ideas of Deity.

To elucidate our meaning still more broadly as to elements and elemental energies in *universal* action, beyond their finite limitation as first before stated in respect to their want of causative power in vital evolution, — let us call in evidence the paramount master of all other principles, that acts in, through, and upon all bodies of matter alike, regardless of kind, quality, or condition.

The testimony of this witness will show that finite, limited things, or what we know of as such, are also infinite, by virtue of infinite energies in the possession of all things, or by being constituents of a supreme oneness; and at the same time it will discredit one of the assumptions of atheism, — that the physical world, or the whole mass of matter in our solar system, contains within itself sufficient power to account for all its material forms of being.

This witness tells us, by figures of mathematical certainty, that nothing in the world, not the earth itself, nor the whole solar system, individually, has ever had within it a sufficiency of inherent power to have caused, or to continue its present state of existence.

What power can it be that will demonstrate this? What energy of universal matter, or that emanates from every part and particle of it, has been the universal cause and perpetual preserver of every planet, every sun, every star, and every solar system in the illimitable field of space? In other words, what do we call that especial essence of substance without which the formation of worlds had not been possible, and the existence of which is not conceivable apart from, independent of, or outside the infinity of matter whereof it formed the universe it controls? Is it that great uniting, changing, creative force which we call chemical attraction, or affinity? Is it magnetism, or electricity?

No doubt these energies are universal; and trillions of miles beyond our solar system, the light of nebulæ, or the nebulous illumination called the Milky Way, may be made by electricity in hydrogen gas; or magnetism, and that chemical mystery so close akin to life itself, are undoubtedly engaged in action throughout the universe; but these forces and some others of which we know by their effect, are conditional, qualitative, dependent on surroundings, or changeable in action according to the nature, relation, and combination of different materials.

So the impartial governor, the immutable ruler that nothing can change, limit or exclude, that rolled the heavenly bodies into form and holds them in its grasp, must be something else. This something of supreme effluence, that acts the part of imperial ruler like a universal will, was discovered in respect to its laws and the absolute certainty of its unchangeable, uniform action, by Sir Isaac Newton, the greatest genius in his field of science that has ever lived. His mathematical proofs in regard to it were first confined to the earth, then extended to the moon, and so onward into the whole planetary system, where the laws of Kepler were found to unite in evidence with all the other determined facts, to verify the mighty demonstration.

Over sixty years before the completion of Newton's discovery, the immortal John Kepler, in the year 1618, after seventeen years of persistent trial, gave to astronomy his three great planetary laws, the cause of which he mistook for magnetism, or attraction and repulsion by electrical polarity. He found a wonderful outside key to the infinite combination, but he failed to search down into the necessary nature of a cause as it was found by Newton. Kepler knew by the solution of his stupendous problem that there must be a general, perpetual, invariable power to make those results of planetary motion which his labor had revealed, but the demonstrated law of its universal action he never knew. No person in the whole world ever knew it until Sir Isaac Newton proved the rule, the universal scope, the complex, boundless reign of that greatest principle in matter, called *the attraction of gravitation.*

The stress of its power in and among all bodies, as related by distance, weight and motion, has been the means by which astronomers have actually weighed the globes of our solar system, and discovered the farthest planet, Neptune, from the sun 2,775,000,000 miles away, before its existence was ever known by telescopic sight.

Such is the character of that infinite energy possessed of all things, which testifies for both sides of that apparent contrariety we seek to explain, — inasmuch as it exemplifies how each thing, or every portion of matter, from atoms up to worlds, has forever lacked the inherent, individual power to make evolutionary changes, while at the same time it shows how everything contributes to make whatever it becomes in evolution by means of a supreme consummation of power which engenders, moves, and governs all things.

Gravity thus affords the best solution of nature's elemental paradox, and it also gives us the best conception possible of an absolute, immutable, self-existent, creative cause of action, by teaching how it is that the reciprocal and opposing energies of nature may constitute and consummate the omnific power of God.

It is not to be supposed, however, because the world could not begin to be, nor continue to exist without it, that the force of gravity is the sole attendant cause of diversified action that made physical phenomena appear upon the earth. There are other energies, each one of which is so essential that without it no living form of nature could ever begin to exist. Oxygen, for example, is an invisible power, variously distributed, that forms about one-half of all the material world; and without oxygen there could be neither water nor air, and without one, as also without both of these, there could be no organic life — no transmutation of the inorganic into organic forms.

To conclude from this that oxygen is the only primal cause of all living things would be absurd; not only because it could not become water without hydrogen, nor the air we breathe without nitrogen, but because there are still other indispensable energies besides the organogens, the non-existence of which would have precluded the beginning of organized life, no less certainly than a want of gravity would have prevented the formation of the earth itself. For instance, that vivific energy which performs so many miracles, electricity is also a *sine qua non* of nature's vital action, both in the air and in the physical or chemical changes necessary within animal bodies. And more than this, — beyond the necessity of its planetary use in earth, air, and animal life, — electricity is doubtless an essential of solar force, that helps the solar magazine to project light and heat upon our planet from millions of miles away.

For another example — if the luminous heat of the sun, or its chemical effect in matter were to cease, all vegetal and animal life would disappear, and the earth would become a dead body, frozen into a state of utter desolation. So it is evident that if the energy of sunbeams had never been, the evolution of nature's organic life could never have begun. The wisdom of oxygen and carbon, together with the genius of all their associate elements and every other energy, excepting heat, could not make the simplest plant, or the tiniest insect, from water, earth and air, without the effect of solar energy.

The ancient sun-worshipers, who thought the sun to be the original source and center of all creative power, chose a far more worthy object to adore than other idolators who gave their worship to smaller gods, the best of which were made or imagined in the form of man. Look, for a moment, at what the sun performs.

Like a loving parent who keeps her offspring from danger, with persistent energy, it holds the planetary family in their various paths of safety. The whole vegetable world, and the animal world which depends upon this for existence, are nothing else but solidified gases, condensed and vitalized chiefly by the light and heat of the sun. It enables the green leaves to appropriate carbon from the air, and prepares the vegetal ingredients in the soil that are taken up by the roots. By means of aerial gases condensed into the immense vegetation of countless ages ago, it has embodied the force of its light and heat in an immensity of coal and oil within the earth. When we enjoy the food we eat, the clothes we wear, the swift motion of a steamship, or a steam car, the houses we live in and their artificial heat in winter, let us reflect with gratitude, that like ourselves, they are all the result of sun-power — in the sense that they would have been impossible without it — although it has worked in commutal action with other powers, each one of which has been likewise indispensable in making things what they are.

But looking still further, out beyond the limit of an ancient sun-worshiper, we realize that the sun itself is a dependent, intermediary cause, the vitalizing energy of which is effected, possibly by electric force, or most probably by material combustion carried on with supplies gathered from space by means of gravity.

When we thus review the complex maze of interdependent things, faculties and functions of nature, to which all living evolutions owe their existence, we are brought into an actual, appreciative sense, or knowledge of Deity. Webster defines deity as "the collection of attributes which make up the nature of a god." A more adequate definition of what is herein meant by deity is this: the omnipotent combination of things and attributes which constitute the nature and the complete existence of Supreme Being.

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